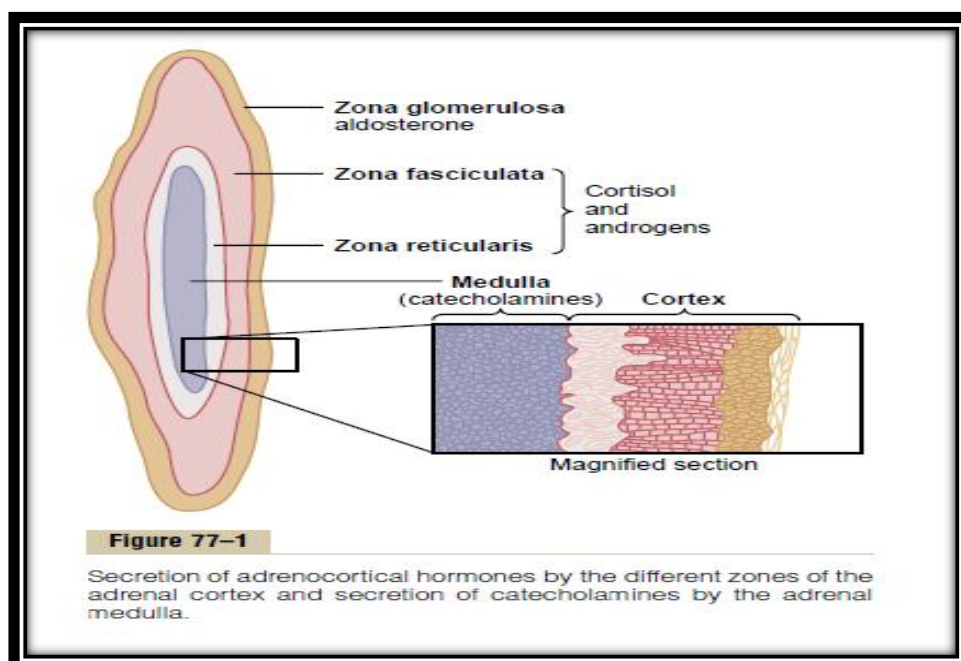




Adrenocortical hormones

- There are two adrenal glands located above kidneys. They're also called suprarenal glands.
- The adrenal gland divided into two portions: 1) cortex 2) medulla
- Cortex (80%) is bigger than Medulla (20%).
- Medulla hormones are 1) epinephrine. 2) norepinephrine.
- Adrenocortical hormones (cortex hormones) are also called corticosteroids and they are:
 - 1) Glucocorticoids: called by this name because it increases blood Glucose.
 - 2) Mineralocorticoids: called by this name because it affects minerals Na^+ , K^+ .
 - The principle mineralocorticoid $\rightarrow$ Aldosterone.
 - The principle Glucocorticoid $\rightarrow$ Cortisol.



-Aldosterone Function : causes renal reabsorption of Na^+ and excretion of K^+ .

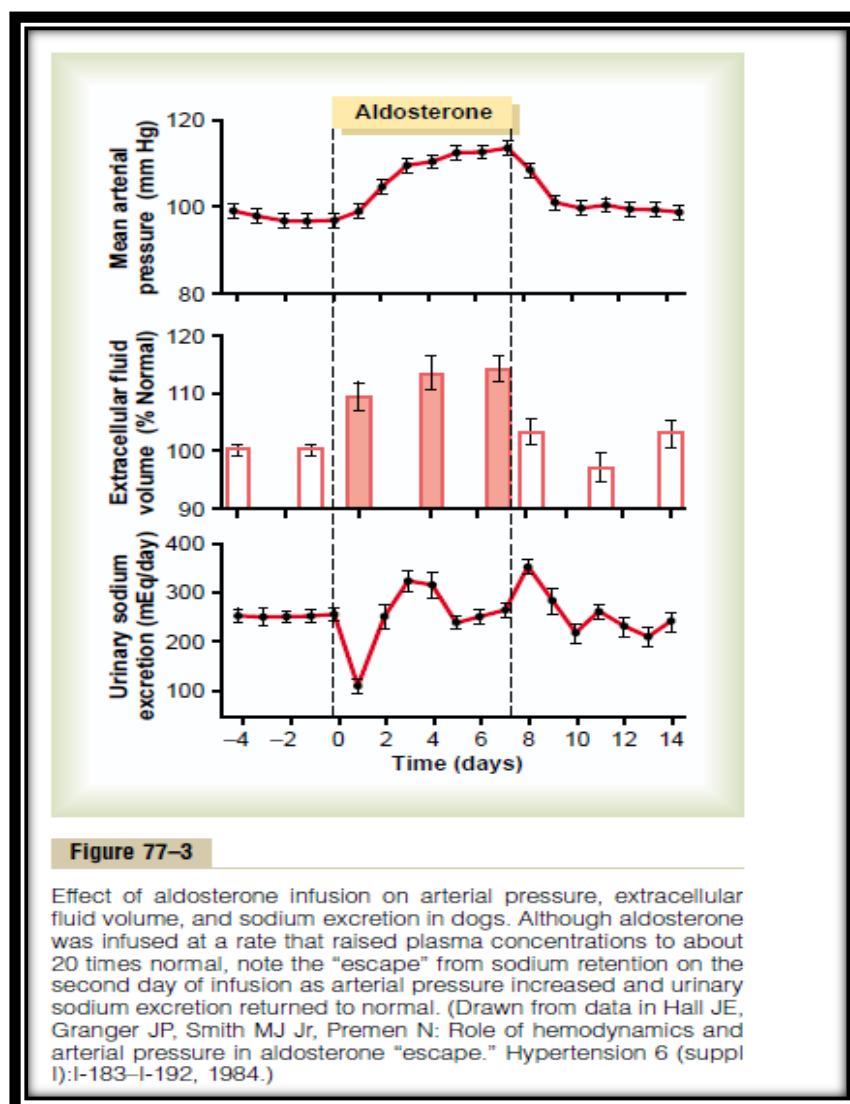
- Increase in aldosterone concentration. $\rightarrow$ More renal reabsorption of Na^+ and this will lead at the same time to:

1) $\rightarrow$ Osmotic absorption of fluid $\rightarrow$ Increase interstitial fluid which will go to to blood $\rightarrow$ Increase extracellular fluid volume.

2) Also $\rightarrow$ Stimulation of thirst center $\rightarrow$ More drinking of water $\rightarrow$ increase ECF volume.

- Both will lead to increase Blood volume $\rightarrow$ increase Cardiac output increase arterial pressure(AP) which will lead to arterial hypertension

- Decrease in aldosterone $\rightarrow$ failure of Na^+ reabsorption $\rightarrow$ Osmotic diuresis $\rightarrow$ increase renal output of water fluid $\rightarrow$ decrease ECF volume that lead to Arterial hypotension.



- Aldosterone on K⁺: Increase in aldosterone → Excretion of K → hypokalemia.

- Decrease in aldosterone → hyperkalemia.

- Also from the effects of aldosterone is:

1) Reabsorption of Na, CL in excretory ducts of salivary + sweat glands, this will keep Na⁺ in hot environment or if there is excessive secretion of saliva.

2) Reabsorption Of Na⁺ in colon, so if there is deficiency of Aldosterone that will lead to Failure of reabsorption Na⁺, CL, Water → diarrhea.

- Regulation of Aldosterone Secretion:-

1) Increase ECF K⁺ concentration → increase Aldosterone
Excrete K⁺.

2) Increase angiotensin 2 → increase aldosterone (when there is increase in Na⁺ concentration in the renal interstitial fluid → Concentration difference → Increase osmotic reabsorption of fluid by aldosterone Increase ECF volume).

3) Increase Na⁺ → decrease aldosterone. (Little effect)

4) ACTH (which secreted by anterior pituitary gland) Necessary for Secretion of the aldosterone, but has a little effect on its regulation.

*The first tow points are the most important factors for the regulation of aldosterone secretion.

Glucocorticoid :(Cortisol or hydrocortisone)

- Cortisol is the Principle glucocorticoid hormone secreted by adrenal cortex.

- 95% of glucocorticoid activity achieved by cortisol.

- Cortisol effect on carbohydrates:

- increase blood glucose by stimulating gluconeogenesis and decrease rate of glucose utilization by the cells.

- If there is increase in cortisol secretion → hyperglycemia and decrease sensitivity of tissue cells to the effect of insulin (insulin resistance), so increase in cortisol can lead to diabetes (adrenal diabetes).

*One of the complications of the extensive usage of cortisol is diabetes.

*The normal diabetes caused by pancreas (pancreatic diabetes).

- Cortisol effect on protein:

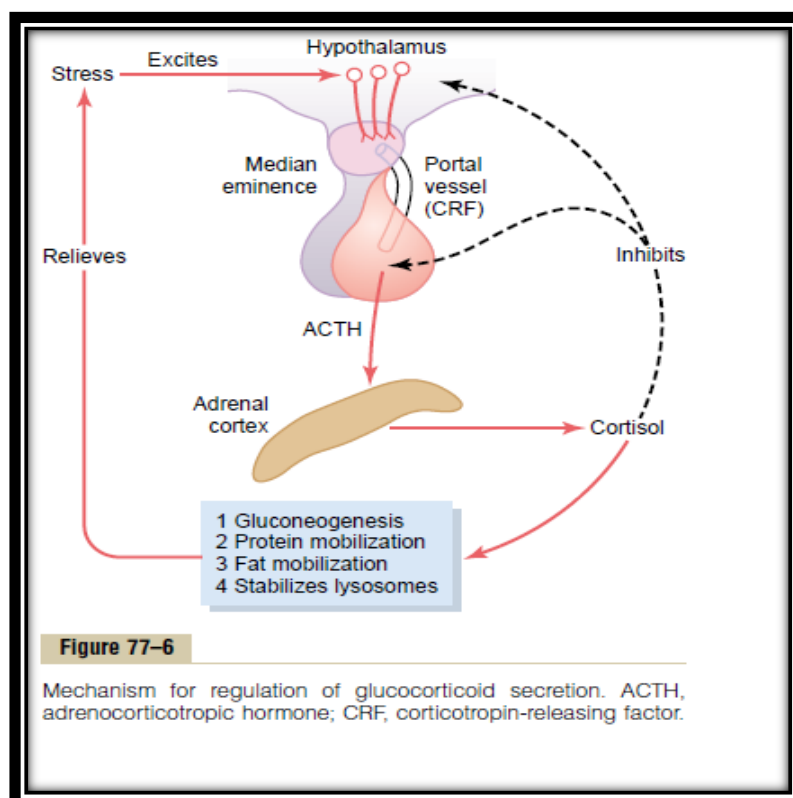
- increase protein catabolism in most cells except liver cell → increase the amino acids concentration, so increase the amino acids transport into liver cells → increase formation of protein by the liver cells.

- Cortisol effect on fat:

- increase mobilization of fats from adipose tissue → increase fatty acids concentration → fatty acids become the main substrate for energy.

- Cortisol and stress relation:

- Any type of stress either physical (infection or trauma) or neurogenic (mental stress, psychological stress) → increase corticotropin releasing factor (CRF) by the hypothalamus → increase ACTH → increase the cortisol, so there is a relation between cortisol and stress.
- When physical stress (bacterial infection) occurs → Inflammation of tissue can happen.
- When inflammation occurs → damage of tissue → release of chemical substance (histamine, bradykinin and others), the effect of these substances → cause inflammation signs.
- Signs of inflammation (increase blood flow, increase permeability of capillary → leakage of fluid in tissue space, migration of WBC to inflamed tissue).



- Cortisol has anti-inflammatory effect (secreted or injected) by :

1) Stabilization of the lysosomal membranes and became more difficult to rupture (the lysosomes are one of the intracellular structures of the cells which contains inflammatory substances, so lysosomes are consider the main factor for the inflammation signs. Therefore, the cortisol will decrease the inflammation signs by stabilization of lysosomal membranes which will lead to decrease permeability of capillary → decrease leakage, decrease migration of WBC to inflamed tissue and decrease phagocytosis of damaged tissue cells).

2) Decrease reproduction of lymphocyte or suppression of immune system which in turn reduce the WBC migration to the inflamed area.

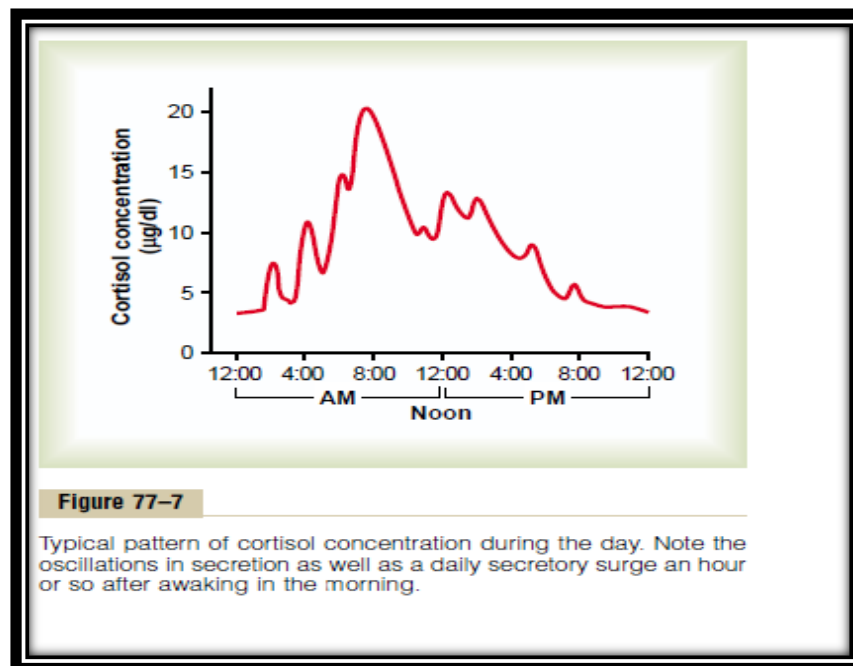
3) Attenuate fever (decrease) by:

WBC release IL-1 after phagocytosis which affect temperature control system (T.C.S) of hypothalamus that lead to fever, so cortisol decrease the release of IL-1 by WBC → decrease fever.

- Cortisol can treat:-

- from the anti-inflammatory effects of cortisol is suppression of the immune system, so if there is transplantation of any organs such as heart or kidney, Immunological rejection will occur, because of the difference of the antigens of transplanted organ and self antigens, therefore cortisol is used to prevent immunological rejection in patients that have transplanted organ.

-The secretion rates of CRF, ACTH, Cortisol has biorhythmic variation or circadian rhythm throughout the day(in early morning, cortisol will increase to 20 µg/dl at 8am and in late evening, it will decrease



to 5 µg/dl at 12pm).this is the normal cycle when person awakes the morning and sleeps the night ,but if the opposite occur, the cycle may change.

- Another hormone is secreted by adrenal cortex is **adrenal androgens** (male sexual hormone) especially during fetal life.
- It is believed that part of the early development of male sex organs result from childhood secretion of adrenal androgens .
- In female, growth of axillary and pubic hair results from adrenal androgen.
- concerning of hyper-secretion of adrenal cortex (cortisol):
 - When adenoma of adrenal cortex, adenoma of anterior pituitary gland or abnormal function of hypothalamus happened, this lead to hyper-secretion of cortisol (Cushing's syndrome).

- Cushing's syndrome:

Mobilization of fats from the lower part and excess of fat deposition in chest and head regions.

- Characteristics of Cushing's syndrome:

- 1) Moon face, rounded face.
- 2) Buffalo like torso.



هذه الملخصات هي منكم عن إجتهد شخصي لمجموعة من طلاب الطب البشري / عدن معتمدين على عدة مصادر مما تم محاضرتة أو قراءته ... وقد تفيد البعض منكم وللعلم ليس لها أية علاقة مباشره بأي عضو من أعضاء الهيئة التعليمية في الكلية.
زملائنا الأعزاء إن أصبنا فمن الله، وإن أخطأنا فمن أنفسنا ومن الشيطان " نبقى بشراً نخطئ ونصيب فلذا يرجى الإشعار في حالة وجود أي ملاحظات عبر إيميل الجروب:

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